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Toru Nakakubo

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EXAMINER

RADEMAKER, CLAIRE L

ART UNIT

PAPER NUMBER

1795

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/510,215	<b>Applicant(s)</b> NAKAKUBO ET AL.	
	<b>Examiner</b> CLAIRE L. RADEMAKER	<b>Art Unit</b> 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 4/21/10.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)         | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)         | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on April 21, 2010 has been entered. Claims –13 are pending. Claims 14-42 are cancelled. Claims 1-3, 6, and 9-13 have been amended.

2. The text of those sections of Title 35, U.S.C. code not included in this action can be found in the Office Action issued on June 23, 2009 which is referred to in the prior office Action issued on December 22, 2009.

### ***Claim Rejections***

3. The claim rejections under 35 U.S.C. 112, first paragraph, on claims 1-13 are withdrawn, because Applicant's arguments are persuasive. The claim rejections under 35 U.S.C. 112, second paragraph, on claims 1-13 are withdrawn, because Applicant's arguments are persuasive. The claim rejections under 35 U.S.C. 103(a) as being unpatentable over Streckert et al. in view of Schmitman on claims 1 & 4 are withdrawn, because Applicant's argument are persuasive. The claim rejections under 35 U.S.C. 103(a) as being unpatentable over Streckert et al. in view of Schmitman and Zhu on

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claims 2-3 & 8 are withdrawn, because Applicant's argument are persuasive. The claim rejections under 35 U.S.C. 103(a) as being unpatentable over Streckert et al. in view of Schmitman and McElroy on claim 5 is withdrawn, because Applicant's argument are persuasive. The claim rejections under 35 U.S.C. 103(a) as being unpatentable over Streckert et al. in view of Schmitman and Kagitani on claims 6-7 are withdrawn, because Applicant's argument are persuasive. The claim rejections under 35 U.S.C. 103(a) as being unpatentable over Streckert et al. in view of Schmitman and Togasawa et al. on claims 9-10 are withdrawn, because Applicant's argument are persuasive. The claim rejections under 35 U.S.C. 103(a) as being unpatentable over Streckert et al. in view of Schmitman and Shimada on claim 11 is withdrawn, because Applicant's argument are persuasive. The claim rejections under 35 U.S.C. 103(a) as being unpatentable over Streckert et al. in view of Schmitman, Zhu et al., and Togasawa et al. on claims 12-13 are withdrawn, because Applicant's argument are persuasive.

### ***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claim 4 is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential elements, such omission amounting to a gap between the elements. See MPEP § 2172.01. The omitted elements are: exactly how the fuel cell system can be immersed in the water supplied to the fuel cell system. It is unclear how to submerge the fuel cell system in water because 1) the fuel cell system is attached to

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the charger which supplies the water, and 2) if it is only the fuel cell itself that is immersed in the water, not the whole fuel cell system, then it is unclear how a fuel cell can be immersed in water without damaging the fuel cell or having safety concerns.

### ***Claims Analysis***

6. The Examiner notes that the instant claims are drawn to an apparatus and that it has been held that while features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function (MPEP 2144) and that a claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim (MPEP 2144). Therefore, the process and functional limitations of the instant claims were not given patentable weight, and the apparatus of the instant claims was Examined in terms of structure.

### ***Claim Rejections - 35 USC § 102***

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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8. Claims 1 & 8 are rejected under 35 U.S.C. 102(b) as being anticipated by Routtenberg (WO 01/28017).

With regard to claim 1, Routtenberg discloses a charger / external system (601, page 25, lines 5-20; Figure 6) for a fuel cell system / internal system (602, page 25, lines 5-8 & 21-27; Figure 6) which includes a power intake electrode / internal port (623, page 25, lines 21-24; Figure 6), wherein the charger is detachable from the fuel cell system / internal system (page 26, lines 20-22; Figure 6), and comprises:

A water supply means (609, page 25, lines 9-13; Figure 6) that supplies water to the fuel cell system / internal system (page 25, lines 9-13; Figure 6);

A power supply port / external port (604, page 25, lines 9-10; Figure 6) constructed to provide a detachable electric connection to the power intake electrode of the fuel cell system / internal system (page 25, lines 9-10 & page 26, lines 20-22; Figure 6); and

Power supply means (606, page 25, lines 9-11; Figure 6) that supplies electric power via the power supply port to the power intake electrode of the fuel cell system / internal system (page 25, lines 9-11 & page 26, lines 1-12; Figure 6);

Wherein the power supply means supplies electric power for electrolyzing water supplied by the water supply means to the fuel cell system / internal system to generate hydrogen through use of an ion conductor / membrane included in a fuel cell of the fuel cell system / internal system (page 25, line 28—page 26, line 19 & page 27, line 28 – page 28, line 38; Figures 6-7).

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With regard to claim 8, Routtenberg discloses that the power supply means further includes power control means / controller (603 & 615, page 25, lines 9-10 & 14-17; Figure 6) that controls electric power to be supplied to the fuel cell system / internal system (page 25, lines 9-10 & 14-17 & page 26, line 33 – page 27, line 11; Figure 6).

***Claim Rejections - 35 USC § 103***

9. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Routtenberg (WO 01/28017), as applied to claim 1 above.

The disclosure of Routtenberg as discussed above is fully incorporated herein.

With regard to claim 2, Routtenberg fails to specifically state that the power supply port and the power intake electrode are insulated from the outside.

While Routtenberg fails to specifically state that the power supply port and the power intake electrode are insulated from the outside, one of ordinary skill in the art would understand it would be advantageous to insulate the power supply port and the power intake electrode from the outside in order to prevent them from the outside elements and minimize corrosion and damage.

10. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Routtenberg (WO 01/28017), as applied to claim 1 above, and further in view of Mérida-Donis (US 6,569,298).

The disclosure of Routtenberg as discussed above is fully incorporated herein.

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With regard to claim 3, Routtenberg teaches that the power supply means (606, page 25, lines 9-11; Figure 6) includes a plug for obtaining AC power supply from an outside (page 26, lines 5-12; Figure 6), where the power is supplied via the power supply port to the power intake electrode of the fuel cell system (25, line 28—page 26, line 19; Figure 6), and teaches the concept of the fuel cell system / internal system comprising an AC/DC converter (618, page 226, lines 9-12; Figure 6), but fails to teach a transformer or the concept of the power supply means in the charger / external system comprising an AC/DC converter and transformer.

Mérida-Donis teaches the concept of a power supply means (704, col. 15, lines 12-14) for an integrated power apparatus (70, col. 15, lines 12-14) which contains a fuel cell / PEMFC and electrolyzer / PEME (col. 14, lines 55 - 65) comprising a power converter (709, col. 15, lines 16) between the power source and the integrated power apparatus (col. 15, lines 12-23), where the power converter can comprise an AC/DC converter and a transformer (col. 15, lines 18-23) in order to ensure electrical compatibility (i.e. to ensure that a compatible voltage is supplied to the integrated power apparatus) (col. 15, lines 18-23).

It would have been obvious to one of ordinary skill in the art at the time of the invention to add the concept of a power supply means for an integrated power apparatus comprising a power converter comprising an AC/DC converter and a transformer of being between the power source and the integrated power apparatus Mérida-Donis to the charger / external system and fuel cell system of Routtenberg in order to ensure electrical compatibility (i.e. to ensure that a compatible voltage is

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supplied to the integrated power apparatus) (col. 15, lines 18-23) and to save space (and thus energy consumption) on the portable fuel cell system.

11. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Routtenberg (WO 01/28017), as applied to claim 1 above, and further in view of McElroy (US 4,795,683).

The disclosure of Routtenberg as discussed above is fully incorporated herein.

With regard to claim 5, Routtenberg fails to teach that the water supply means comprises means that changes water into a mist state and supplies the mist to the fuel cell system.

McElroy teaches that a water supply means for supplying water to a fuel cell (col. 2, line 8) can comprise means that changes water into a mist state (an aspirator) and supplies the water to the fuel cell system (col. 2, lines 8-21) in order to allow cooling of the fuel cell without need for a separate cooling chamber (col. 2, lines 18-22).

It would have been obvious to one of ordinary skill in the art at the time of the invention to add the means that changes water into a mist state and supplies the mist to the fuel cell system of McElroy to the charger / external system and fuel cell system of Routtenberg in order to allow cooling of the fuel cell without need for a separate cooling chamber (col. 2, lines 18-22).

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12. Claims 6-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Routtenberg (WO 01/28017), as applied to claim 1 above, and further in view of Kagitani (US 2002/0022162).

The disclosure of Routtenberg as discussed above is fully incorporated herein.

With regard to claims 6-7, Routtenberg fails to teach a cooler that cools the fuel tank of the fuel cell system, or a heater that heats a cell section of the fuel cell system.

Kagitani teaches the concept of a fuel cell system comprising a cooler / cooling loop that cools the fuel tank of the fuel cell system (paragraph [055]; Figure 2) and a heater / heat pump & heat exchanger (5b & 5a, paragraph [0055]; Figure 2) which heat a cell section of the fuel cell system (paragraph [0055]; Figure 2) during filling of the fuel tank (paragraph [0055]) in order to increase storage rate of fuel / hydrogen in the fuel tank and to maintain efficiency of the fuel cell system (paragraph [0055]).

It would have been obvious to one of ordinary skill in the art at the time of the invention to add the concept of having a cooler / cooling loop cool the fuel tank and the concept of a heater / heat pump & heat exchanger heating a cell section of the fuel cell system during filling of the fuel tank of Kagitani to the charger / external system and fuel cell system of modified Routtenberg in order to increase storage rate of fuel / hydrogen in the fuel tank and to maintain efficiency of the system (paragraph [0055]).

Modified Routtenberg fails to teach the concept of the cooler and heater being in the charger / external system.

While modified Routtenberg fails to teach the concept of the cooler and heater being in the charger / external system, one of ordinary skill in the art would understand

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that it would be advantageous to have the cooler and heater be in the charger / external system because the cooler / cooling loop and heater / heat pump & heat exchanger would only be used when the fuel cell system is attached to the charger / external system and the fuel tank is being refilled, so having the cooler / cooling loop and heater / heat pump & heat exchanger be in the charger / external system would allow the benefits of the cooler / cooling loop and heater / heat pump & heat exchanger to be obtained during refilling of the fuel tank, while saving space (and thus energy consumption) on the portable fuel cell system.

13. Claims 9-10 & 12-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Routtenberg (WO 01/28017), as applied to claim 1 above, and further in view of Togasawa et al. (US 2002/0014277).

The disclosure of Routtenberg as discussed above is fully incorporated herein.

With regard to claims 9-10, Routtenberg fails to teach a pressure sensor provided in the fuel tank of the fuel cell system, a valve control means, or a fuel supply valve provided in a fuel flow path that introduces hydrogen to the fuel cell.

Togasawa et al. teaches the concept of fuel cell (6, paragraph [0052]) comprising a fuel / hydrogen tank (3, paragraphs [0029] & [053]) comprising a pressure sensor (paragraphs [0029] & [0053]) that detects the pressure within the fuel / hydrogen tank (paragraphs [0022] & [0029]), a fuel supply valve (5, paragraphs [0029] & [0052]), and a controller (paragraphs [0029] & [0053]) that controls said valve to vary the hydrogen-filling rate depending upon the pressure detected by said sensor (paragraphs [0029]-

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[0030]) in order to allow the fuel / hydrogen tank to be filled rapidly while suppressing exothermic phenomenon during the course of filling (paragraph [0001]).

It would have been obvious to one of ordinary skill in the art at the time of the invention to add the concept of a fuel cell comprising a fuel tank with a pressure sensor that detects the pressure within the fuel tank, a valve, and a controller that controls said valve to vary the hydrogen-filling rate depending upon the pressure detected by said sensor of Togasawa et al. to the fuel cell system of Routtenberg in order to allow the fuel / hydrogen tank to be filled rapidly while suppressing exothermic phenomenon during the course of filling (paragraph [0001]).

Modified Routtenberg fails to teach that the valve control means is in the charger / external system.

While modified Routtenberg fails to teach that the valve control means is in the charger / external system, one of ordinary skill in the art would understand that it would be advantageous to have the valve control means be in the charger / external system because the valve control means would only be used when the fuel cell system is attached to the charger / external system, so having the valve control means be in the charger / external system would allow the benefits of the valve control means to be obtained, while saving space (and thus energy consumption) on the portable fuel cell system.

With regard to claims 12-13, Routtenberg teaches a charger / external system (601, page 25, lines 5-20; Figure 6) for a fuel cell system / internal system (602, page 25, lines 5-8 & 21-27; Figure 6) which includes a power intake electrode / internal port

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(623, page 25, lines 21-24; Figure 6), wherein the charger is detachable from the fuel cell system / internal system (page 26, lines 20-22; Figure 6), and comprises:

A water supply means (609, page 25, lines 9-13; Figure 6) that supplies water to the fuel cell system / internal system (page 25, lines 9-13; Figure 6);

A power supply port / external port (604, page 25, lines 9-10; Figure 6) constructed to provide a detachable electric connection to the power intake electrode of the fuel cell system / internal system (page 25, lines 9-10 & page 26, lines 20-22; Figure 6); and

Power supply means (606, page 25, lines 9-11; Figure 6) that supplies electric power via the power supply port to the power intake electrode of the fuel cell system / internal system (page 25, lines 9-11 & page 26, lines 1-12; Figure 6), where the power supply means further includes power control means / controller (603 & 615, page 25, lines 9-10 & 14-17; Figure 6) that controls electric power to be supplied to the fuel cell system / internal system (page 25, lines 9-10 & 14-17 & page 26, line 33 – page 27, line 11; Figure 6);

Wherein the power supply means supplies electric power for electrolyzing water supplied by the water supply means to the fuel cell system / internal system to generate hydrogen through use of an ion conductor / membrane included in a fuel cell of the fuel cell system / internal system (page 25, line 28—page 26, line 19 & page 27, line 28 – page 28, line 38; Figures 6-7).

But fails to teach a pressure sensor provided in the fuel tank of the fuel cell system.

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Togasawa et al. teaches the concept of fuel cell (6, paragraph [0052]) comprising a fuel / hydrogen tank (3, paragraphs [0029] & [053]) comprising a pressure sensor (paragraphs [0029] & [0053]) that detects the pressure within the fuel / hydrogen tank (paragraphs [0022] & [0029]), a fuel supply valve (5, paragraphs [0029] & [0052]), and a controller (paragraphs [0029] & [0053]) that controls said valve to vary the hydrogen-filling rate depending upon the pressure detected by said sensor (paragraphs [0029]-[0030]) in order to allow the fuel / hydrogen tank to be filled rapidly while suppressing exothermic phenomenon during the course of filling (paragraph [0001]).

It would have been obvious to one of ordinary skill in the art at the time of the invention to add the concept of a fuel cell comprising a fuel tank with a pressure sensor that detects the pressure within the fuel tank, a valve, and a controller that controls said valve to vary the hydrogen-filling rate depending upon the pressure detected by said sensor of Togasawa et al. to the fuel cell system of Routtenberg in order to allow the fuel / hydrogen tank to be filled rapidly while suppressing exothermic phenomenon during the course of filling (paragraph [0001]).

14. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Routtenberg (WO 01/28017), as applied to claim 1 above, and further in view of Mitlitsky et al. (US 2003/0148153).

The disclosure of Routtenberg as discussed above is fully incorporated herein.

With regard to claim 11, Routtenberg fails to teach a residual capacity detecting means.

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Mitlitsky et al. teaches the concept of a charger / external system for a fuel cell system (paragraphs [0008], [0018]-[0019], & [[0025], & [0034]) comprising a controller / residual capacity detecting means (paragraphs [0034] & [0030]) that displays information regarding the fuel refilling process (paragraphs [0034] & [0030]) on the basis of a signal conveying a pressure of hydrogen / fuel from a pressure sensor provided in the fuel tank / hydrogen tank in a fuel cell system (paragraphs [0034] & [0030]).

It would have been obvious to one of ordinary skill in the art at the time of the invention to add the concept of a charger / external system for a fuel cell system comprising a controller / residual capacity detecting means that displays information regarding the fuel refilling process on the basis of a signal conveying a pressure of hydrogen / fuel from a pressure sensor provided in the fuel tank / hydrogen tank in a fuel cell system of Mitlitsky to the charger/external system of Routtenberg in order to allow informed and efficient refilling of a fuel tank / hydrogen tank in a fuel cell system from a charger / external system (paragraphs [0007], [0034], & [0030]).

### **Response to Arguments**

#### **Claim Rejections - 35 USC § 112**

15. Applicant's arguments with regard to the rejections of claims 1-13, filed on April 21, 2010, have been fully considered and the Examiner's rejections are withdrawn due to the Applicant's amendments and arguments.

However, now claim 4 is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential elements, such omission amounting to a gap

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between the elements. See MPEP § 2172.01. The omitted elements are: exactly how the fuel cell system can be immersed in the water supplied to the fuel cell system. It is unclear how to submerge the fuel cell system in water because 1) the fuel cell system is attached to the charger which supplies the water, and 2) if it is only the fuel cell itself that is immersed in the water, not the whole fuel cell system, then it is unclear how a fuel cell can be immersed in water without damaging the fuel cell or having safety concerns.

#### Claim Rejections - 35 USC § 103

16. Applicant's arguments, see page 1, filed April 21, 2010, with respect to the rejection(s) of claim(s) 1-13 under 103 have been fully considered and are persuasive. Therefore, the rejection has been withdrawn.

However, upon further consideration, a new ground(s) of rejection is made in view of Routtenberg (WO 01/28017), Mérida-Donis (US 6,569,298), McElroy (US 4,795,683), Kagitani (US 2002/0022162), Togasawa et al. (US 2002/0014277), and Mitlitsky et al. (US 2003/0148153).

#### **Conclusion**

17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to CLAIRE L. RADEMAKER whose telephone number is (571)272-9809. The examiner can normally be reached on Monday - Thursday, 8:00AM - 4:00PM, EST.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dah-Wei Yuan can be reached on 571-272-1295. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/C. L. R./  
Examiner, Art Unit 1795

/Dah-Wei D. Yuan/  
Supervisory Patent Examiner, Art Unit 1795